CLAIMS

What is claimed is:

1. A method for improving system performance in a building environment including a refrigeration system controlled by a refrigeration controller, the refrigeration system including at least one refrigeration case in each of a plurality of circuits, a rack having a plurality of compressors, an unloader for each compressor, a rack controller, a suction header disposed upstream of the rack, a discharge header disposed downstream of the rack, a condenser, a condenser fan, and at least one pressure sensor and at least one temperature sensor, said method comprising:

(A) installing a temperature monitoring system for the refrigeration system;

(B) performing a temperature audit on the at least one refrigeration case;

(C) calibrating the at least one temperature sensor and the at least one pressure sensor;

(D) obtaining operating parameters of the refrigeration system;

(E) testing multiple components of the refrigeration system;

(F) adjusting at least one of operating pressure and operating temperature of the at least one component of said multiple components; and

(G) tracking resulting system stability.

2. The method of claim 1, further comprising troubleshooting the refrigeration system to obtain desired temperature readings.

3. The method of claim 1, wherein the environment further includes an HVAC system and further comprises adjusting the HVAC system according to desired setpoints.

4. The method of claim 1, wherein the environment further includes a lighting system and further comprises adjusting internal lighting levels of the lighting system to desired setpoints.

5. The method of claim 1, wherein said installing a temperature monitoring system includes installing a suction return gas temperature monitor.

6. The method of claim 5, wherein said installing a suction return gas temperature monitor includes attaching temperature sensors to assigned suction lines.

7. The method of claim 1, wherein said performing a temperature audit includes performing a product temperature audit.

8. The method of claim 7, wherein said performing a temperature audit further includes measuring the discharge air temperature of the at least one refrigeration case.

9. The method of claim 1, wherein said obtaining operating parameters of the refrigeration system includes measuring an oil level in the reservoir and plurality of compressors.

10. The method of claim 1, wherein said obtaining operating parameters of the refrigeration system includes testing an oil sample from a compressor for contaminants.

11. The method of claim 1, wherein the refrigeration system further includes a hot gas defrost valve, a heat reclaim valve, and a receiver, and said obtaining parameters includes measuring an oil level in the receiver with the heat reclaim valve in a first position and the hot gas defrost valve in a second position.

12. The method of claim 11, wherein the first position is on and the second position is off.

13. The method of claim 11, wherein the first position is off and the second position is on.

14. The method of claim 11, wherein the first position is on and the second position is on.

15. The method of claim 11, wherein the first position is off and the second position is off.

16. The method of claim 1, wherein the refrigeration system further includes a holdback valve, and said obtaining operating parameters of the refrigeration system includes verifying the holdback valve setting.

17. The method of claim 16, wherein said verifying the holdback valve setting further includes lowering the pressure in the condenser.

18. The method of claim 1, wherein the refrigeration system includes a receiver and a receiver pressurization valve, and said obtaining operating parameters of the refrigeration system includes verifying the receiver pressurization valve setting.

19. The method of claim 18, wherein said verifying the receiver pressurization valve setting includes simultaneously measuring pressures upstream and downstream of the receiver.

20. The method of claim 1, wherein the refrigeration system includes a liquid line filter, and said performing pressure drop and efficiency tests includes measuring a pressure drop across the liquid line filter.

21. The method of claim 1, wherein the refrigeration system further includes a holdback valve, a heat reclaim valve, a gas defrost valve, and a discharge header, and said performing pressure drop and efficiency tests includes measuring high side to liquid pressure drops with the heat reclaim and gas defrost valves in a first and second position.

22. The method of claim 21, wherein said measuring high side to liquid pressure drops includes measuring the pressure drop from the discharge header to a location downstream of the condenser and upstream of the holdback valve.

23. The method of claim 21, wherein the first position is on and the second position is off.

24. The method of claim 21, wherein the first position is off and the second position is on.

25. The method of claim 21, wherein the first position is on and the second position is on.

26. The method of claim 21, wherein the first position is off and the second position is off.

27. The method claim 26, further including conducting pressure measurements when the pressure drop exceeds a predetermined value.

28. The method of claim 27, wherein the predetermined value is about 6 psig to about 10 psig.

29. The method of claim 27, wherein the refrigeration system includes an oil separator, and said conducting additional pressure measurements includes measuring a pressure drop across the oil separator.

30. The method of claim 29, wherein said measuring a pressure drop across the oil separator further contacting a supervisor when the pressure drop exceeds a predetermined value.

31. The method of claim 30, wherein the predetermined value is about 10 psig.

32. The method of claim 27, wherein said conducting additional pressure measurements further includes measuring a pressure drop across the heat reclaim valve when the heat reclaim valve is in a predetermined position.

33. The method of claim 32, wherein the predetermined position is on.

34. The method of claim 32, wherein the predetermined position is off.

35. The method of claim 32, wherein said measuring a pressure drop across the heat reclaim valve further includes contacting a supervisor when the pressure drop exceeds a predetermined value.

36. The method of claim 35, wherein the predetermined value is about 10 psig.

37. The method of claim 27, wherein said conducting additional pressure measurements further includes measuring a pressure drop across the gas defrost valve when the gas defrost valve is in a predetermined position.

38. The method of claim 37, wherein the predetermined position is on.

39. The method of claim 38, wherein the predetermined position is off.

40. The method of claim 37, wherein said measuring a pressure drop across the gas defrost valve further includes contacting a supervisor when the pressure drop exceeds a predetermined value.

41. The method of claim 40, wherein the predetermined value is about 40 psig.

42. The method of claim 27, wherein the refrigeration system further includes a liquid line gas defrost differential boost valve, and said conducting additional pressure measurements further includes measuring a pressure drop across the liquid line gas defrost differential boost valve when the liquid line gas defrost differential boost valve is in a predetermined position.

43. The method of claim 42, wherein the predetermined position is on.

44. The method of claim 42, wherein the predetermined position is off.

45. The method of claim 42, wherein said measuring a pressure drop across the liquid line gas defrost differential boost valve further includes contacting a supervisor when the pressure drop exceeds a predetermined value.

46. The method of claim 40, wherein said predetermined value is about 40 psig.

47. The method of claim 27, wherein said conducting additional pressure measurements further includes adjusting the liquid line gas defrost differential boost valve.

48. The method of claim 47, wherein said adjusting the liquid line gas defrost differential boost valve includes forcing the liquid line gas defrost differential boost valve to an on position.

49. The method of claim 48, wherein said adjusting the liquid line gas defrost differential boost valve further includes adjusting the differential to 25 psig.

50. The method of claim 48, wherein said adjusting the liquid line gas defrost differential boost valve includes activating one of the plurality of circuits to a defrost condition.

51. The method of claim 27, wherein the refrigeration system includes a suction filter, and said conducting additional pressure measurements further includes measuring a pressure drop across the suction filter.

52. The method of claim 51, wherein the suction filter includes a filter drier core disposed therein, and said measuring a pressure drop across the suction filter includes replacing the filter drier core when pressure drops above a predetermined guideline.

53. The method of claim 52 wherein said predetermine guideline is about 1 psig to about 2 psig.

54. The method of claim 1, said wherein performing pressure drop and efficiency tests further includes preparing the refrigeration system to be controlled by electronic controls.

55. The method of claim 54, wherein said preparing the refrigeration system to be controlled by electronic controls includes adjusting mechanical backup controls outside operating parameters of electronic controls.

56. The method of claim 55, wherein said adjusting mechanical backup controls includes adjusting mechanical low pressure controls to a predetermined level below a rack suction pressure set point.

57. The method of claim 56, wherein the predetermined level is about 5 psig.

58. The method of claim 55, wherein said adjusting mechanical backup controls includes adjusting mechanical high pressure controls to a predetermined level above a rack head pressure set point.

59. The method of claim 58, wherein the predetermined level is about 20 psig.

60. The method of claim 1, wherein said performing pressure drop and efficiency tests further includes testing compressor efficiency.

61. The method of claim 60, wherein said testing compressor efficiency includes measuring the suction pressure upstream of the compressor and the discharge pressure downstream of the compressor.

62. The method of claim 60, wherein said testing the compressor efficiency includes turning the rack controller on and off to verify that the compressor is being controlled.

63. The method of claim 1, wherein said performing pressure drop and efficiency tests further includes testing each of the compressor unloaders.

64. The method of claim 1, wherein said performing pressure drop and efficiency tests further includes testing the condenser efficiency.

65. The method of claim 64, wherein said testing the condenser efficiency includes verifying that the condenser surface is free of debris.

66. The method of claim 64, wherein said testing the condenser efficiency includes verifying that fans for the condenser are operational.

67. The method of claim 64, wherein said testing the condenser efficiency includes verifying that the circulating pump is operational.

68. The method of claim 64, wherein said testing the condenser efficiency includes checking each fixture for non-condensables.

69. The method of claim 1, wherein said adjusting operating pressures of at least one component includes lowering operating condensing pressures.

70. The method of claim 69, wherein said lowering operating condensing pressures includes reducing minimum head pressures.

71. The method of claim 70, wherein said reducing minimum head pressures includes adjusting fan setpoints for the condenser.

72. The method of claim 70, wherein the refrigeration system further includes a holdback valve, and said reducing minimum head pressures includes adjusting the holdback valve.

73. The method of claim 72, wherein said adjusting the holdback valve includes lowering the condensing pressure.

74. The method of claim 73 wherein said lowering the condensing pressure includes forcing the condenser fans on.

75. The method of claim 73 wherein said lowering the condensing pressure includes sprinkling water on air cooled condensers.

76. The method of claim 73 wherein said lowering the condensing pressure includes shutting down the circuits.

77. The method of claim 73 wherein said lowering the condensing pressure includes shutting down the compressors.

78. The method of claim 72, wherein said adjusting the holdback valve includes reducing discharge pressure a predetermined amount below a desired setpoint.

79. The method of claim 78, wherein the predetermined amount is about 20 psig.

80. The method of claim 72, wherein said adjusting the holdback valve includes turning off the isolation valve.

81. The method of claim 72, wherein said adjusting the holdback valve includes backing out an adjustment stem until the holdback valve dumps.

82. The method of claim 1, wherein said tracking resulting system stability includes troubleshooting the refrigeration cases identified as over-temperature.

83. The method of claim 82, wherein said troubleshooting the refrigeration cases includes checking the refrigeration cases for low airflow.

84. The method of claim 1, further comprising remotely monitoring the refrigeration system.

85. The method of claim 84, wherein said remotely monitoring includes tracking system stability.

86. The method of claim 1, wherein said testing multiple components of the refrigeration system includes testing operating pressure of at least one component.

87. The method of claim 1, wherein said testing multiple components of the refrigeration system includes testing operating temperature of at least one component.

88. The method of claim 1, wherein said installing a temperature monitoring system includes installing a suction line return gas temperature monitoring system.

89. The method of claim 1, further comprising calibrating service gauges prior to said testing multiple components of the refrigeration system.

90. The method of claim 1, wherein the environment further includes an anti-condensate heater and further comprising adjusting said anti-condensate heater to desired setpoints.